1. A method of operating a radio frequency (RF) signal processing circuit comprising the steps of:

a. establishing a wireless communications channel between a first access point and a second access point in accordance with a communications protocol;

b. monitoring transmission conditions in said wireless communications channel, including an available data rate, to determine whether a first transmission mode or a second transmission mode should be used;

c. performing a first set of signal processing operations at said first access point on a single received RF signal from said second access point when said first transmission mode is used;

d. performing a second set of signal processing operations at said first access point on M independent RF received signals from said second access point when said second mode of operation is used;

wherein data transmissions between said first access point and said second access point are compliant with said communications protocol in both said first transmission mode and said second transmission mode.

2. The method of claim 1, wherein said second mode is automatically enabled when transmission conditions indicate that a data rate in said channel has fallen below a predetermined threshold.

3. The method of claim 1, wherein said second mode is automatically enabled when transmission conditions indicate that a data rate in said channel is to be enhanced above a nominal operating rate.

4. The method of claim 1, wherein said communications protocol is based on an 802.11x communications protocol.

5. The method of claim 1 wherein said second set of signal processing operations introduce a latency, and said latency is compensated using a dummy data response to maintain compatibility with said communications protocol.

6. The method of claim 1 wherein said second set of signal processing operations is performed by a multiple-in, multiple out (MIMO) processor.

7. A method of performing multi-antenna radio frequency (RF) communications comprising the steps of:

performing data transmissions during a first operating mode in a channel at a first access point using a first baseband processor;

performing data transmissions during a second operating mode in said channel at said first access point using a multi-antenna signal processing circuit, including the following steps:

(a) receiving M independent RF modulated input signals from a second access point;

(b) processing said M independent RF modulated input signals using a channel mixing matrix to extract N independent data signals transmitted by said second access point;

wherein said first operating mode and said second operating mode are automatically selected based on a transmission condition in said channel.

8. The method of claim 7, wherein said multi-antenna signal processing circuit processes at least 4 separate input signals.

9. The method of claim 7, further including a step of using a channel mixing matrix to perform an operation that computes a recovered data signal x as follows:

$$x = b1*y1 + b2*y2 + x0$$

where b1 and b2 are equalization coefficients computed by said multi-antenna signal processing circuit, y1 and y2 are received data from separate baseband channels, and x0 is a recovered signal from an adjacent channel.

10. The method of claim 7, wherein space division multiple access is realized by separating different RF signals from different directions simultaneously in the multi-antenna signal processing circuit.

11. The method of claim 7, wherein said multi-antenna signal processing circuit extends a data transmission range achieved by said baseband processor circuit between said first access point and said second access point.

12. The method of claim 7, wherein said multi-antenna signal processing circuit increases a data transmission rate achieved by said baseband processor circuit between said first access point and said second access point.

13. The method of claim 7, wherein said multi-antenna signal processing circuit transmits M separate data signals to said second access point.

14. The method of claim 13, wherein a localized encryption is achieved for said second access point by independently controlling said M separate transmission signals.

15. A method of transmitting and receiving data in a 802.11x compatible communications channel using a plurality of radio frequency (RF) received signals comprising the steps of:

(a) operating a first baseband processor to handle data transmissions in a first mode between a first access point and a second access point in accordance with an 802.11x protocol, based on a first channel transmission condition;

(b) operating a multi-signal processor to handle data transmissions in a second mode between said first access point and said second access point in accordance with an 802.11x protocol under a second channel transmission condition, during which time said multi-signal processor:

i) receives M independent RF modulated input signals from said second access point;

ii) processes said M independent RF modulated input signals using a channel mixing matrix to extract N independent data signals transmitted by said second access point;

(c) transmiting an RF modulated signal to said second access point using a point coordination function (PCF) mode associated with said 802.11x protocol so as to maintain timing compatibility;

wherein said multi-antenna signal processing circuit operates with a first baseband processor to receive and transmit RF signals in a channel between said first access point and said second access point.

16. The method of claim 15, wherein said multi-signal procossor processes data using a high rate direct sequence spread spectrum (HR/DSSS) physical layer frame structure that has a preamble and header compatible with said 802.11x protocol.

17. The method of claim 16, wherein said header includes additional data to identify a high rate mode.

18. The method of claim 16, wherein said header includes additional data to identify a modulation format.

19. The method of claim 15, wherein said multi-signal processor generates a dummy response signal to said second access point to mask a latency associated with decoding a received data packet.

20. The method of claim 15, wherein said channel mixing matrix is blindly estimated using a Herault-Jutten network.